

STEEL

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Quality not quantity for Thyssen

By CHRISTIAN KÖHL

DÜSSELDORF — At the inauguration of the world's largest integrated compact strip production (CSP) mill in Duisburg, Germany, executives of Thyssen Krupp Stahl AG said that the company in the medium-term will actually reduce its hot-rolling capacity and put an emphasis on higher-quality products.

The Duisburg CSP plant, originally planned by the former Thyssen Stahl AG in cooperation with SMS Schloemann Siemag AG, processes strip with a thickness between 0.8 and 6.35 millimeters. It cost 600 million deutschemarks (\$330 million) to build.

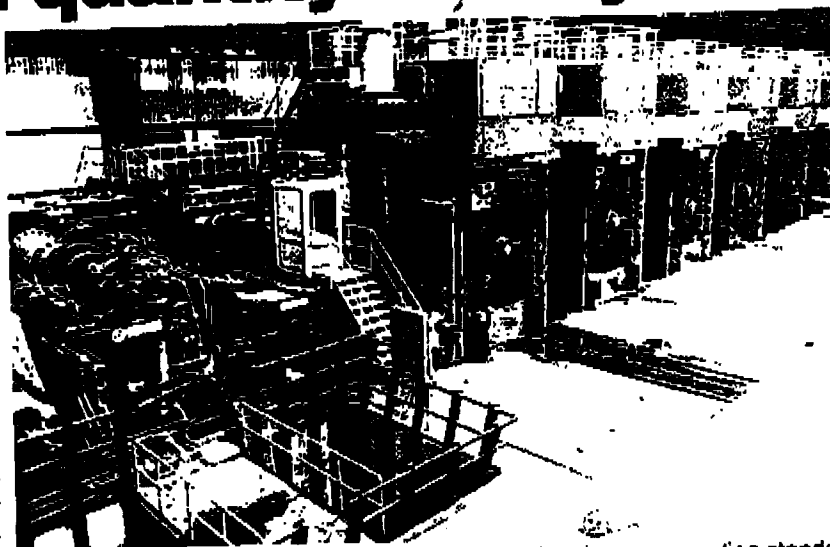
The new plant, which has a design capacity of 2 million tonnes per year, will replace the Dortmund facility, which is gradually slowing down its production from 3.5 million tonnes per year. After Thyssen closes the Dortmund facility, it will operate four hot rolling mills—two conventional mills and the CSP plant in Duisburg, and one at stainless steel unit Nirosta in Bochum.

The transition from Duisburg to Dortmund will cost jobs: Dortmund employs 1,000 people, while the CSP line at Duisburg will be operated by 187.

"Ultimately, we will reduce our output of hot-rolled strip to 14 million tonnes, thus contributing to market stability," said Wolfgang Kohler, chief executive officer of Thyssen Krupp Stahl.

As sales of hot-rolled strip to outside customers were declining, the conventional lines increasingly will serve the company's own cold rolling mills and the electric sheet and tin plate production of subsidiaries EBG and Rasselstein Hoesch, while the CSP plant will focus on production for outside customers, he said.

Kohler said that Thyssen originally expected rising sales when planning the project, but those conditions have not prevailed



The finishing line at Thyssen Krupp Stahl's new plant has seven rolling stands.

due to increased European imports. He noted that lower qualities dominated the imports, and Thyssen therefore would pursue a strategy of improvement rather than expansion. "We are leading in higher-quality levels and we will increase capacities here while cutting back on lower qualities," he said.

According to board member Claus Hendricks, 65 percent of the CSP mill's output will be low-carbon steel to be galvanized for the carmaking industry, 23 percent will be construction steels, 8 percent c-steels and 4 percent polyphase alloys.

Thyssen's board member in charge of sales, Jost A. Massenberg, said that the company put particular emphasis on surface-treated material for the automotive industry, which accounts for a third of its sales. This summer, Thyssen completed the modernization of its hot-dip galvanizing facility in Duisburg, boosting its capacity to 460,000 tonnes per year from 90,000 tonnes. Later this year, Thyssen will award a supply contract for a new hot-dipped galvanizing line in Dortmund.

With an investment of DM290 million (\$159 million), that plant will process 350,000 tonnes per year, increasing Thyssen's share of surface-treated flat products to 80 percent, Massenberg said.

Die vier Warmbreitband-Walzwerke sind vollautomatisiert und mit modernsten Rechnersystemen ausgerüstet, die den Produktionsprozess steuern und regeln, den Materialfluss permanent überwachen und den jeweiligen Zustand und Ort des Materialstücks erfassen und dokumentieren.

Der Arbeitsablauf gliedert sich in die Teilbereiche

- Vorbereitung und Sortierung der Vorbrammen
- Erwärmen der Vorbrammen
- Walzen der Vorbrammen zu Warmbreitbändern
- Abkühlen und Wickeln der Warmbreitbänder

Ein ständig wachsender Anteil der Vorbrammenerzeugung wird den Wärmöfen

direkt heiß zugeführt. Die Brammen werden nach der Zusammenfassung zu Walzprogrammen in gasbeheizten Wärmöfen auf Walztemperatur gebracht. Die Walzung erfolgt in der Vorstraße und anschließend in den 7gerüstigen Fertigstaffeln in halb bis dreiviertelkontinuierlichen Walzprozessen. Modernste Messeinrichtungen überwachen die genaue Einhaltung von Dicke, Breite, Bandprofil, Ebenheit und Temperaturführung. Im Rahmen des Qualitätsmanagements unterliegen diese Messeinrichtungen einer ständigen Kontrolle (Kalibrierung, Wartung).

Eigene Entwicklungen und Optimierungen in der Mess- und Regeltechnik für Bandprofil und Bandebenheit ermöglichen die Einhaltung einer gewünschten Bandform. Beispielsweise kann durch Verschieben bzw. Biegen der Arbeits-

walze die Form des Warmbandes im Online-Verfahren beeinflusst werden. In Verbindung mit einem speziellen Walzenschliff (siehe Seite 23) dient die Axialverschiebung der Arbeitswalzen der gezielten Einstellung des Warmbandprofils. Die Einhaltung enger Dickentoleranzen wird durch hydraulische Dickenregelungen sichergestellt.

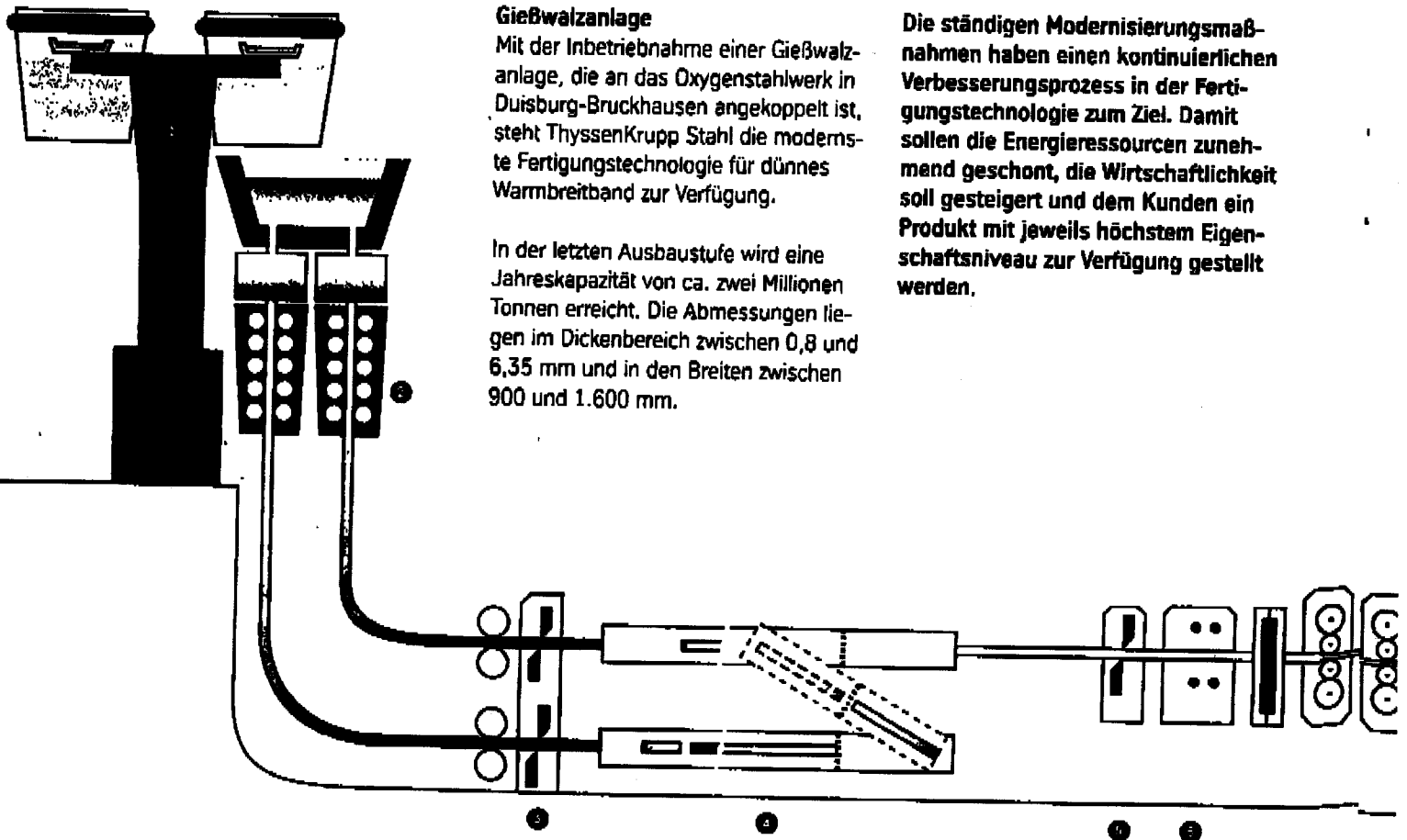
Nach dem Walzen wird das Band mit Wasser auf die geforderte Temperatur abgekühlt und in der Haspelanlage zum Coil aufgewickelt. Eine Mess- und Probenstation im Bereich der Haspelanlage stellt die Ausgangskontrolle des fertigen Warmbandes sicher.

Gießwalzanlage

Mit der Inbetriebnahme einer Gießwalzanlage, die an das Oxygenstahlwerk in Duisburg-Bruckhausen angekoppelt ist, steht ThyssenKrupp Stahl die modernste Fertigungstechnologie für dünnes Warmbreitband zur Verfügung.

In der letzten Ausbaustufe wird eine Jahreskapazität von ca. zwei Millionen Tonnen erreicht. Die Abmessungen liegen im Dickenbereich zwischen 0,8 und 6,35 mm und in den Breiten zwischen 900 und 1.600 mm.

Die ständigen Modernisierungsmaßnahmen haben einen kontinuierlichen Verbesserungsprozess in der Fertigungstechnologie zum Ziel. Damit sollen die Energieressourcen zunehmend geschont, die Wirtschaftlichkeit soll gesteigert und dem Kunden ein Produkt mit jeweils höchstem Eigenschaftsniveau zur Verfügung gestellt werden.



The four hot strip mills are fully automated and equipped with the most modern computer systems for the control and regulation of the production process and for continuous supervision of the material flow pattern whilst monitoring and documenting the actual condition and location of the respective material.

The production sequence is subdivided into

- preparation and sorting of slabs
- heating the slabs
- rolling the slabs to hot-rolled wide strip
- cooling and coiling the hot-rolled wide strip

An ever growing proportion of slabs are directly charged into the slab heating

furnaces in a hot condition. After allocation to rolling programmes the slabs are heated up to rolling temperature in gas fired furnaces. Rolling starts on the roughing train and is completed on the 7-stand finishing train in a semi-to three quarter continuous rolling process. The latest instrumentation monitors the exact adherence to thickness, width, profile, flatness and temperature specifications. In the framework of quality management, these measuring instruments are subject to constant inspection (calibration, maintenance).

In-house development and optimization of instrumentation and control engineering for strip profile and flatness ensure adherence to the required strip shape. By shifting or bending the work rolls, for example, the shape of the hot-rolled coil and strip can be influenced in an on-line

process. In combination with a special roll contour (see page 23) the axial shifting of the work rolls enables accurately targeted adjustment of the hot-rolled coil and strip profile. Adherence to strict thickness tolerances is assured through an hydraulic gauge control systems.

After rolling, the strip is cooled with water to the required temperature and coiled in the downcoiler. A measuring and sampling station in the coiling zone monitors the finished hot-rolled coil and strip.

Casting rolling plant

With the commissioning of the casting rolling plant which is coupled to the oxygen steel plant in Duisburg-Bruckhausen, ThyssenKrupp Stahl will be able to avail itself of the most modern production technology for thin hot-rolled wide strip.

In the final construction phase, an annual capacity of some 2 million tonnes will be reached. The dimensions then available will range between thicknesses from 0.8 to 6.35 and widths from 900 to 1,600 mm.

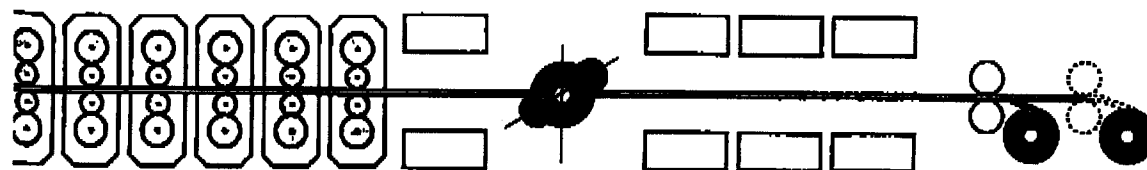
Constant measures for modernization are directed towards a continuous process of improvement in manufacturing technology. The results are increased savings in energy resources, higher efficiency and a product for the customer with properties of the highest level.

Schematische Darstellung des Produktionsablaufs.

- ① Drehturm
- ② Gießmaschine
- ③ Scheren
- ④ Tunnelofen mit Schwenkfähre
- ⑤ Notschere
- ⑥ Zunderwäscher
- ⑦ Fertigstaffel mit Zwischengerüstkühlung
- ⑧ Intensivkühlung
- ⑨ Kurzbandhaspel
- ⑩ Laminarkühlung
- ⑪ Haspel

Schematic diagram of the course of production.

- ① Ladle turret
- ② Casting machine
- ③ Shears
- ④ Continuous furnace with swivel table
- ⑤ Emergency shear
- ⑥ Water descaler
- ⑦ Finishing train with inter-stand cooling
- ⑧ Intensive cooling
- ⑨ Short strip coiler
- ⑩ Laminar cooling
- ⑪ Coilers



**Declaration of Marc W. Nagley
Crane Plumbing**

I, Marc W. Nagley, declare and state to the best of my knowledge, information and belief that:

1. I serve as General Manager for Crane Plumbing and have been involved in the sanitary bath ware industry for over 16 years. Crane Plumbing is one of the largest manufacturers and distributors of plumbing fixtures and specialty plumbing products in North America. Crane Plumbing has been in business for over 16 years. We have over 20 manufacturing plants throughout the United States and employ over 3000 persons.
2. Crane Plumbing must import certain high-end cold-rolled enameling steel to manufacture its bathtub, lavatory and sink products because domestic mills have been unable or unwilling to supply the quality of cold-rolled enameling required by Crane in a consistent, competitive and timely manner.
3. Cold-rolled enameling steel is a specialty cold-rolled steel product that can be enameled (i.e. covered with porcelain coating). Generally speaking, cold rolled enameling steel can be used to manufacture plumbing fixtures (e.g., bathtubs, lavatories, and sinks) and appliance fixtures (e.g. stove tops, washer and dryer frames, oven cavities). However, different types of cold-rolled enameling steel are required to manufacture bathtubs vs. stove tops. Specifically, a "deep drawing" quality steel with excellent enameling qualities is required to manufacture sanitary bath ware, such as bathtubs and sinks. In contrast, standard steel (e.g. steel without special deep-drawing capabilities) can be used to manufacture most appliances, such as stove tops, due to their flatter shape.
4. Crane Plumbing understands that no domestic steel mill manufactures the specific high-end type of Cold-Rolled enameling steel manufactured by Thyssen Krupp Stahl.
5. We have attempted repeatedly to obtain from domestic steel suppliers cold-rolled enameling steel suitable for manufacturing our bath ware products. Crane has researched and contacted all of the U.S. domestic mills known to manufacture some type of cold-rolled enameling steel, which we understand are U.S. Steel, Inland Steel, AK Steel and LTV. Among these U.S. producers only AK Steel and LTV produce an "Interstitial-Free" (IF)

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enameling steel that can be used in deep drawing processes such as those required to manufacture Crane's bathtubs.

6. Although in the mid- and late 1990's Crane Plumbing was able to obtain deep-drawing enameling steel products from AK Steel and LTV, these domestic suppliers lost interest in supplying the deep-drawing material to Crane Plumbing. It is our understanding that this occurred due to several reasons. First, based on my past experience, whenever increased demands are placed on the domestic mills by the automobile sector, it appears that the domestic mills decided not to supply the specialty cold-rolled products we require. Second, the domestic mills have experienced difficulties producing consistently a product meeting our strict product specifications. Third, due to the fact that LTV and AK Steel are located in the Midwestern part of the country, high freight costs are involved in sending the enameling steel material to Crane's Dallas facility. There are no major integrated steel mills manufacturing cold-rolled steel products located in the same region of the country as Crane's Dallas facility.
7. We are extremely concerned about Crane's ability to continue its bath ware business if it is unable to import the special deep drawing cold-rolled enameling steel it requires to manufacture bathtubs, lavatories, and sinks. For example, if restrictions on import of this product were imposed, we may not be able to obtain deep-drawing enameling steel. Even if the domestic mills agreed to make the products we require, it usually takes 6 month to 1 year to certify a manufacture as a large-scale supplier. In addition, our production costs could increase so significantly that our products could become uncompetitive, which would seriously damage Crane's business.
8. It would be unfair to impose restrictions on the specialty deep-drawing cold-rolled enameling steel required by Crane Plumbing when the domestic steel manufactures do not manufacture this product or any substitutable product. Such restrictions would have the unfair result of harming Crane Plumbing without benefiting the domestic industry, which is unable or unwilling to supply the deep-drawing cold-rolled enameling steel required by Crane in a consistent manner.


Marc W. Nagley

Date: 11 November 2001